

chemically bound, nor without the mineral constituents like magnesium, calcium, and iron which are known to enter into chemical union with essential parts of the protoplasmic organization. Seifriz himself cites such contradictory facts as the use of hydrogen sulphide, sulphur, and iron as energy sources in certain bacteria. And what of the experiments in the nutrition of rats in which the animals were raised on purified proteins, carbohydrates, and fats, plus a nutrient solution which reads like an elaborate water culture for green plants? The restricted usage for the word food seems to be one of those inherited verbalisms which persists although it will scarcely stand a critical analysis.

General Plant Physiology*

R. C. BENEDICT

"All living things feed. Matter is taken up from without and altered chemically, and from these chemical changes energy is released for growth and movement."

In a companion review to that of Seifriz's "Plant physiology" it is apposite to start with the quotation above as illustrative in part of the nutritional point of view of Barton Wright's new volume. However, the question of a proper definition of the word "food," so far as plants are concerned is not otherwise specifically advanced; the word food does not occur in the index nor, so far as noted, in the text. The title, "General plant physiology" is significant, not only for this volume but also for modern plant physiology as well. The "general physiological" point of view is evident in the four texts in plant physiology which appeared during 1938, either as entirely new books, like the Seifriz and the Barton Wright, or as the much amplified and modified new editions of Miller and Maximov.

This new English text, like another English plant physiology of the year before (Meirion Thomas, 1937), may be highly rated as a reference work for graduate students, for teachers, and for some advanced undergraduate students in botany. In three parts, "I. The general physiology of the cell," "II. Metabolism," and "III. Growth, reproduction and irritability," it is comprehensive but concentrated to a degree which sets it off

* Barton Wright, E. C. General plant physiology. Blakiston. 1938. \$4.50.

from the texts published primarily for use in this country, like the translations of the Russian books by Palladin and Maximov, or those of purely American origin like Seifriz, Raber, and Miller. The Barton Wright is more exhaustive than any of these, except the Miller, which, in its new 1100 page second edition, is in a class by itself. A few minor errors were noted, such as "formanieran," for foraminiferan," Von Mohl as the "coiner" of the word, protoplasm, and Sequoia as reaching 400 feet in height.